

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

"Improvements in a method of making grated high-fat cheese."

I, WILLIAM WARREN TRIGGS, of the firm of Marks & Clerk, of 57 & 58, Lincoln's Inn Fields, London, W.C.2, a British Subject, do hereby declare the invention, (a communication
5 to me from abroad by KRAFT FOODS COMPANY, a corporation organized and existing under the laws of the State of Delaware, whose post office address is 500 Peshtigo Court, City of Chicago, County of Cook, State of Illinois,
10 United States of America,) for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

15 The present invention consists in a method of making a grated high-fat cheese product free from a tendency to agglomerate under ordinary atmospheric conditions, which method comprises the steps of mixing dried natural
20 high-fat cheese in comminuted form with finely divided particles of dried processed high-fat cheese, and tempering the mixture for a sufficient length of time to cause the fats in the cheese to become stabilized in such a
25 manner that the mixture does not oil off.

The term high-fat type cheese, as used herein, shall refer to cheeses having in excess of 40 per cent milk fat by weight, on a dry basis, and includes such cheeses as American
30 cheese, Swiss cheese, Edam cheese, Blue cheese and Gouda cheese. The term "American" cheese is commonly used to denote cheeses which have the characteristics of Cheddar cheese made by either the stirred
35 curd or milled curd process. American cheeses include, in addition to Cheddar cheeses, Colby cheese and washed curd cheese. In the following parts of the specification, the term "American" will be used in this broadly
40 defined sense.

When high-fat cheese, as for example, natural American cheese, which ordinarily contains at least 50 per cent milk fat on a dry basis, is stored at temperatures about
45 85°F., at normal humidity or at even lower
(Price 3/-)

temperatures when the humidity is high, a portion of the milk fat in the cheese tends to separate from the protein and other constituents of the cheese. This separation is known in the art as "oiling" or "oiling off" 50 and causes the surface of the cheese to become covered with a thin layer of milk fat. This characteristic action has made the storage and distribution of grated or comminuted cheeses of this type very difficult since the presence 55 of the milk fat on the surface of the cheese particles causes the particles to adhere to each other, thereby resulting in agglomeration or caking which prevents the effective use of a shaker top dispenser. Furthermore, oiling off 60 results in oxidation of the fat on the surface of the cheese so that the cheese receives a tallowy flavour which is undesirable. A still further disadvantage of the oiling off characteristic is that it causes the fiber-board 65 containers, in which grated cheese is usually marketed, to become unsightly. This results from absorption of the milk fat by the fiber-board so that the containers have oily spots which tend to pick up dirt and other foreign 70 substances.

The known method for minimizing the undesirable features mentioned above involves dusting the surface of the cheese with an inert, substantially fat-free substance such as 75 skim milk powder to provide an absorbent for surface fat on the cheese and form a dry protective layer over the cheese particles. In order to prevent caking effectively, large amounts of the inert substances are employed, 80 e.g., up to 70 per cent of the weight of the final grated product. Grated high-fat cheese made in this manner can be stored for reasonable periods of time without appreciable caking, but because of the large amounts of 85 inert substances required, the cheese flavor of the product is weak and in some extreme instances is practically non-existent. In addition, the known grated cheeses which have been dusted with inert substances are particularly 90

susceptible to darkening or browning in storage.

The principal object of the present invention is to produce grated high-fat type cheeses which will not lump or cake under ordinary atmospheric conditions and which will not darken during storage and in which a large portion of the cheese is high-fat type cheese and all of the constituents of the final product consist of cheese.

According to the invention, it has been discovered that by treating a portion of the high-fat type cheese of the final grated cheese product in a specific manner and then after the treated portion of the cheese is mixed with the untreated portion, conditioning or tempering the mixture, a grated cheese product may be made which will not lump or cake. The cheese product made by the method of the invention is made from a mixture of high-fat type cheese, one portion of which is a processed, dried cheese, in particle form, and the other portion of which is a natural comminuted cheese which has been dried at a temperature at which the fat in the natural cheese will not oil off. The natural cheese may be dried either before or after comminution. After drying and comminution, the natural cheese is mixed with the dried processed cheese and the entire mixture is then tempered in air at a low relative humidity and a temperature at which the natural cheese will oil off. This tempering treatment is continued for a sufficient length of time to cause the fats in the cheeses to become stabilized in such a manner that they will not oil off to cause caking, lumping, or undesired flavoring of the final product. The tempered mixture may then be placed in shaker type containers and stored under normal atmospheric conditions for extended periods of time.

In the practice of the invention a high-fat natural cheese is first dried to a moisture content of between about 10 and 15 per cent by weight at a temperature which is below the oiling off point of the cheese. The temperature of drying is preferably below about 80°F. Either before or after the drying procedure, the cheese is comminuted to the desired, e.g., finely divided, size. Any of the known types of grating or comminuting mechanisms may be employed. Good results have been obtained by first slicing a natural cheese into extremely thin slices and then milling the cheese in a tumbling mill to obtain the desired sized particles. Another method of comminution which has been employed with success has involved comminuting cheese which is in a chilled condition.

The processed cheese constituent of the grated cheese mixture is preferably made from the natural cheese with which the processed cheese is to be mixed. However, other natural cheese may be employed with a corresponding change in the product. The natural cheese,

which is to be converted to processed cheese, is heated to pasteurizing temperatures with added emulsifier and dried by any suitable procedure, e.g., by spray drying in a blast of hot air in the normal manner, to produce a dried cheese containing between about 2 and 3 per cent moisture. This dried cheese may be finely comminuted either during or after the drying procedure. Spray drying is the most satisfactory procedure for drying the processed cheese since it produces fine, uniform-sized particles. The drying procedure impairs the flavor of the cheese somewhat, but the cheese still retains a good cheese flavor.

A sufficient amount of the finely divided dried processed cheese, which contains between about 2 and 3 per cent moisture by weight, is mixed with the dried natural cheese, which contains between about 10 and 15 per cent moisture, to provide a product which, after a tempering or conditioning operation, will render the dried natural cheese substantially non-caking. It has been found that the amount of processed cheese should amount to about 40 to 70 per cent of the weight of the final grated cheese product to minimize the tendency to agglomerate and other undesired characteristics of the finished product.

The mixture of dried natural and processed cheeses is then tempered or conditioned under controlled temperature and humidity conditions to provide the non-caking product of the invention. This conditioning involves placing the mixture in an atmosphere having a low relative humidity, e.g., about 40 per cent or less, and at a temperature at which the natural cheese will oil off, e.g., a temperature in excess of about 80°F. The temperature, however, should not exceed about 200°F. if satisfactory results are to be obtained. The mixture is maintained under these conditions for a sufficient length of time to become conditioned, i.e., to change the characteristics of the cheese so it will not oil off upon standing under ordinary atmospheric conditions. This tempering operation may require from 15 minutes to 54 hours depending upon temperature and humidity employed, the time of treatment being inversely proportional to temperature.

After the tempering or conditioning operation, the cheese may be screened and then packaged in suitable containers for distribution. The resulting product will keep well under normal un-refrigerated storage conditions and will retain a good cheese flavor.

EXAMPLE.

High quality natural American Cheddar cheese containing 36 per cent moisture and 34 per cent milk fat is first comminuted by slicing the cheese into slices about $\frac{1}{8}$ inches thick. The sliced natural cheese is then air dried at a temperature of about 70°F. until the cheese contains between about 10 to 15 per cent by weight of moisture. The dried

sliced cheese is then milled at a temperature of 70°F. which is below the oiling off point of the cheese until the particle size of the comminuted cheese is about .07 inches. In the
5 alternative, the cheese can be grated while in a chilled condition and then dried.

Another portion of the high quality natural American Cheddar cheese is then melted with about 1 per cent of sodium phosphate emul-
10 sifier and is heated to a temperature of about 200°F. and then spray dried in a stream of air which is maintained at about 300°F. The spray drying process transforms the original American cheese to a powdered form contain-
15 ing about 2 to 3 per cent moisture and of a particle size of about .02 inches. The heating and the addition of sodium phosphate emul- sifier so conditions the milk fats that they are substantially inseparable from the protein and
20 other cheese constituents at ordinary temper- atures.

About 50 parts by weight of the finely divided particles of natural American Cheddar cheese, which contains 10 to 15 per cent
25 moisture, are then mixed with 50 parts by weight of the spray dried American Cheddar cheese which contains 2 to 3 per cent moisture.

The mixture is then tempered or conditioned
30 by being maintained in air at a temperature of about 98°F. and at a relative humidity of 40 per cent for 48 hours. This tempering period under controlled conditions and temperatures conditions the cheese so that it becomes free
35 from a tendency to agglomerate. During the tempering step, the mixture, which contains between about 6 and 9 per cent moisture by weight, loses about 2 to 4 per cent of its moisture content so that by the end of the
40 tempering period the mixture contains about 4 to 5 per cent by weight of moisture.

As an alternative procedure, the mixed cheese is tempered in a tumbler type drier. The air is introduced into the drier at 150°F.
45 and at a relative humidity of about 9 per cent while the mixture is tumbled. Tempering is satisfactorily completed in 30 minutes and the tempered mixture contains between 4 and 5
50 per cent by weight of moisture.

After the tempering period is completed, the tempered cheese mixture is screened, dry mixed and packed in containers. Grated cheese made by this process has a pleasing full cheese
55 temperature of 85°F. and a relative humidity of 60 per cent without appreciable lumping or caking. Moreover, the finished product shows little, if any, tendency to darken even when stored under adverse conditions.

What I claim is:—

1. A method of making a grated high-fat cheese product free from a tendency to agglomerate under ordinary atmospheric con-
60 ditions, which method comprises the steps of mixing dried natural high-fat cheese in com- 65 minuted form with finely divided particles of dried processed high-fat cheese, and tempering the mixture for a sufficient length of time to cause the fats in the cheese to become stabil- 70 ized in such a manner that the mixture does not oil off.

2. A method according to Claim 1 in which the tempering of the mixture is effected at a temperature above the oiling-off point of natural high-fat cheese and at a low relative
75 humidity.

3. A method according to Claim 2 in which the relative humidity is not in excess of forty per cent.

4. A method according to Claim 3 in which
80 the tempering of the mixture is effected for a period ranging from fifteen minutes to fifty-four hours, the duration of tempering being inversely proportional to the tempering temper- ature.

5. A method according to Claim 2, 3 or 4 in which the tempering of the mixture is effected at a temperature in the range from
85 80°F. to 200°F.

6. A method according to any one of the 90 preceding claims in which the natural high-fat cheese is comminuted to a finely divided state, the finely divided particles are dried at a tem- perature below the oiling-off point until such particles contain from 10 to 15 per cent by 95 weight of moisture, and then such dried particles are mixed with an amount of finely divided dried processed high-fat cheese suffi- cient to provide a content of processed cheese in the final product of 40 to 70 per cent by 100 weight, such processed cheese having a moisture content of 2 to 3 per cent by weight.

7. A method according to any one of the preceding claims, in which the mixture con-
105 sists of dried comminuted natural American cheese and dried comminuted processed Ameri- can cheese, such mixture being tempered by being maintained for 48 hours in air at a temperature about 98°F., and at a relative humidity of 40 per cent.

8. A method according to any one of the preceding claims, followed by the steps of screening the tempered mixture and packaging the screened material.

9. A method of making grated high-fat
115 cheese substantially as hereinbefore described.

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